UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT SURVEY
BLACK'S MOUNTAIN EXPERIMENTAL FOREST
Season of 1941

and

REVIEW OF LOSSES ON THE BLACK'S MOUNTAIN EXPERIMENTAL FOREST
1933-1940

BY
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Berkeley, California
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Forest Insect Laboratory
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FOREST INSECT SURVEY
BLACK'S MOUNTAIN EXPERIMENTAL FOREST
Season of 1941

INTRODUCTION

A seasonal loss survey on the Black's Mountain Experimental Forest has been made annually since 1937. In 1936 the Bureau of Entomology and Plant Quarantine agreed to assume the responsibility for the seasonal loss cruise (7), and during 1941 completed its fourth consecutive intensive coverage of the area. The record of loss for 1940 and a summary of the 5-year loss record is presented in this report.

OBJECTIVES

Annual cruises of the insect losses on the Black's Mountain Experimental Forest were begun and have been continued in fulfillment of certain objectives agreed upon by the agencies cooperating in the forest research work. These objectives are:

1. To follow intensively infestation trends on the experimental forest and to obtain an accurate accounting of insect conditions, compartment by compartment.

2. To detect centers of high infestation and possible outbreaks for purposes of recommending cutting and control operations.

3. To provide the Experiment Station with data on the annual insect drain from the forest for the maintenance of stand inventories.

4. To provide bases of comparison in testing the efficacy of experimental control tests and procedures.

METHOD OF CRUISING

The 1941 loss survey was divided into two parts. A midsummer cruise covered most of the virgin area. During October the cut-over areas and remaining virgin area were covered. The cruising procedures outlined by Johnson (6) have been used each year. Two "spotters" and a compassman cruise successively contiguous strips ten chains wide through the compartments, making a 100 percent coverage of the forest. Infested trees are blazed, numbered, and their locations mapped on compartment maps. Data concerning tree species, diameter, tree classes, previous topkilling, and insect infestations are recorded on prepared tree forms. The total cruise requires approximately five weeks field work.

TREATMENT OF DATA IN REPORT

In the report losses are expressed in terms of board foot volumes per acre. This provides a convenient basis for comparing variations and differences in the amounts of loss from year to year. The loss data from the virgin areas only furnish the basis for the report. In 1940 this area amounted to almost 6,900 acres, or about 75 percent of the original timbered area. The effect of the reduction of the uncut acreage from year to year would be to decrease the value of loss comparisons between years. However, since 75 percent of the forest was still uncut in 1940, it is not considered that the changes in the acreages affect the significance of such comparisons, with the exception of Block G which is now 60 percent cutover. The reduction of the virgin acreage during the past five seasons is shown in Table 1.

Table 1. Virgin Timbered Acreage Cruised Each Year on Black's Mountain Experimental Forest

Block	1931-36	1937	1938	1939	1940	Autumn, 1941
A	800.6	800.6	800.6	800.6	800.6	800.6
B	1150.9	1150.9	941.5	941.5	941.5	941.5
C	2351.0	2351.0	2351.0	2351.0	2351.0	1855.0
G	2826.5	2826.5	2782.5	1619.5	1126.5	1126.5
P	2003.4	2003.4	2003.4	2003.4	1661.0	1206.1
All	9134.7	8851.7	8479.0	7716.3	6880.9	5930.0

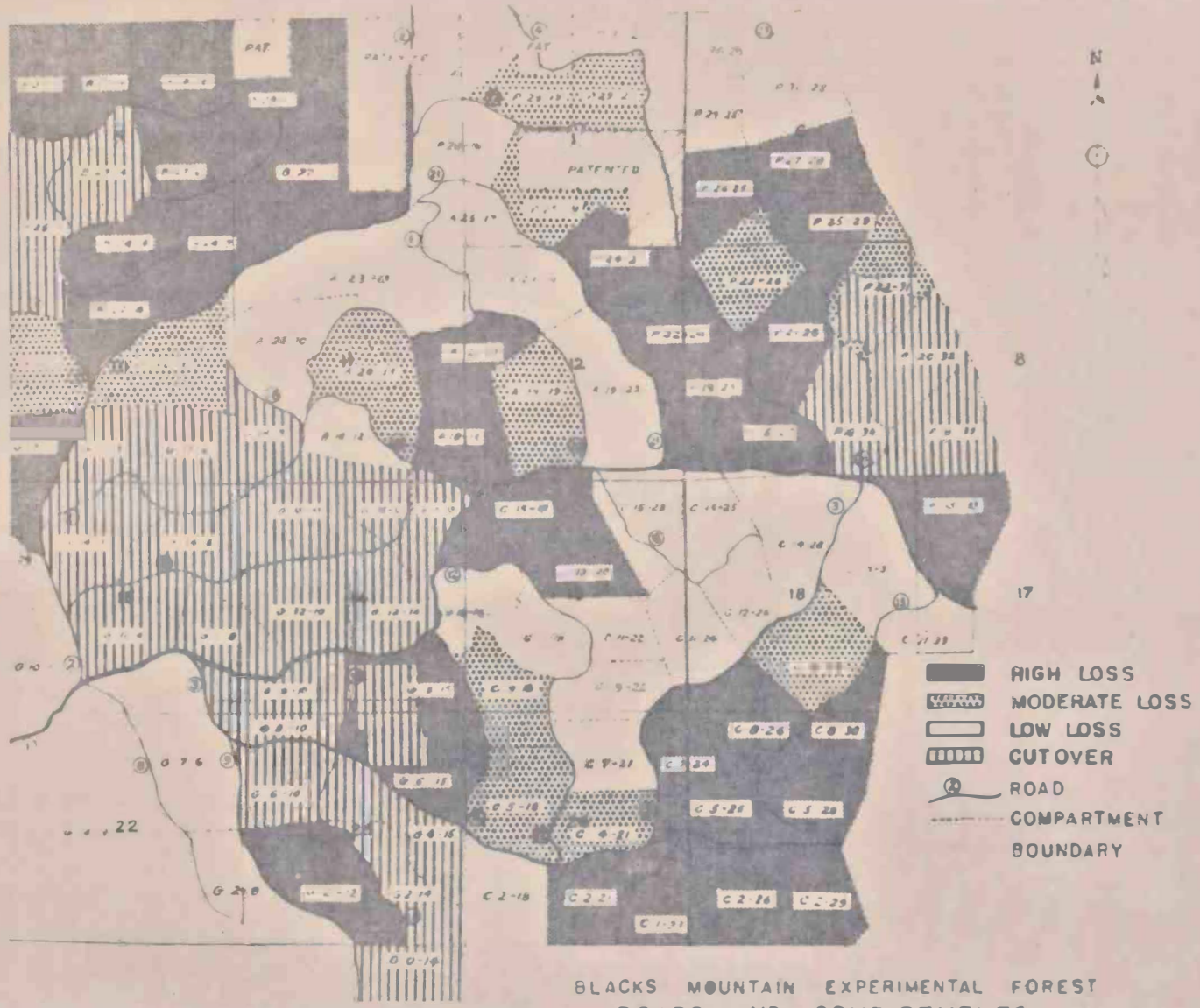
THE 1940 LOSS RECORD

The forest as a whole

The 1940 loss records are summarized in Tables 2 and 3. Pine losses during 1940 were the highest in the past four years, averaging 117 board feet per acre. This represented an increase of 15 percent over 1939, and continued the rise in insect loss that began the previous year. A total of 621 trees with a volume of 802,446 board feet were found infested. This loss amounted to 7 percent of the total 1933 green volume.

General distribution of losses on the forest

While the 1940 insect loss per acre averaged 117 board feet, the infestation was distributed quite unevenly over the whole area. The variations in the loss distribution are shown on the map of the experimental forest accompanying this report. One center of concentrated loss was in the B Block in the northwest corner of the forest. A second center was on the C Block in the southeast corner of the forest. The third large center of loss embraced the more central Block P compartments, and a fourth small zone extended across two Block A and two Block C compartments. Scattered



BLACKS MOUNTAIN EXPERIMENTAL FOREST
ROADS AND COMPARTMENTS
CALIFORNIA FOREST AND RANGE EXPERIMENT STATION

[illegible] Mountain Experimental Forest.

points of high infestation occurred in a few Block C compartments, the greater part of the area of highest insect hazard having been cut over previously for control purposes. With the continuation of the cutting program in 1941, the areas of highest loss in the F Block also were given the benefit of sanitation-salvage treatment.

Losses on the five forest blocks

The loss data for the five units, or blocks, into which the forest is divided are summarized below in the discussion and in Table 2. The five blocks, A, B, C, G, and F, are based upon natural areas with distinct physiographies and with stands of uniform character.

Table 2. 1940 Insect Loss, Mack's Mountain Experimental Forest. Virgin Area. Pines Only.

Block	Number Trees	Volume B.F.	Trees per Acre	Volume per Acre	Ratio 1940/1939	Average Volume per Tree
A	38	60,428	.047	75.5	1.16	1,590
B	130	169,456	.138	180.0	1.31	1,304
C	191	234,077	.081	99.6	.90	1,226
G	89	136,243	.079	120.9	1.68	1,531
F	173	202,240	.104	121.8	1.04	1,169
All	621	802,446	.090	116.6	1.15	1,292

Block A, Aspen Flat, had the lowest per acre loss, averaging 76 board feet. This was 35 percent below the average of the forest as a whole. Losses on the individual compartments ranged from none to 221 board feet per acre. Highest losses were concentrated near the center of the block in two compartments, A 21-17 and A 15-16. As a paradox to the low average loss per acre, the average volume per tree was the highest in the forest, amounting to 1,590 board feet.

Block B, on Mack's Mountain, showed the highest average loss in the forest during 1940, as has been the case in all previous years. The board volume averaged 180 feet per acre, a 31 percent increase over 1939. All compartments in the block showed high losses averaging 54 percent above the forest as a whole. The highest loss amounted to 229 board feet per acre. The average volume per infested tree was 1,304 feet.

Block G, on Cone Mountain, had a relatively low average loss, next to Block A with 100 board feet per acre. In contrast to the other blocks, the infestation declined 10 percent from the 1939 level. The average volume per infested tree was 1,226 board feet. A comparison of compartments shows a great range in current loss from none to 355 board feet, the highest loss per acre in the forest. For the most part, the infestation was concentrated in nine compartments in the southeastern corner of the block.

Block C, Cruso Valley, showed a 1940 loss of 121 board feet per acre. This represented an 82 percent increase over the previous year. The average board foot volume of the infested trees was 1731 board feet. The highest per acre compartment loss was 325 feet. Four of the ten virgin compartments showed high loss levels.

Block F, on Patterson Mountain, had an average loss per acre of [illegible] feet. This volume was an increase of only 4 percent over the previous year. The volume of the average infested tree was the least in the forest, being 1169 board feet. Losses on individual compartments varied from none to 269 board feet per acre. The infestation was centered in the southern two-thirds of the block. Compartments in the northern third of the forest showed rather low loss levels.

Losses by tree species

The status of infestation and amounts of current loss for the four coniferous species occurring in commercial quantities on the experimental forest are shown in Table 3. Ponderosa pine, which predominates in the stand, showed an increase in loss of 11 percent over 1939 to 93 board feet per acre in 1940. The infestation was highest in Block B followed by Blocks C, F, G, and A, in that order.

Table 3. 1940 Insect Loss, Stock's Mountain Experimental Forest. Virgin Area. All Species.

Block	Species	Number Trees	Volume b.m.	Trees per Acre	Volume per Acre
A	Ponderosa Pine	12	24,683	.015	30.8
	Jeffrey Pine	26	35,745	.032	44.7
	White Fir				
	Incense Cedar				
B	Ponderosa Pine	114	141,142	.121	149.9
	Jeffrey Pine	16	28,314	.017	30.1
	White Fir	13	12,756	.014	13.6
	Incense Cedar				
C	Ponderosa Pine	189	231,332	.080	98.4
	Jeffrey Pine	2	2,745	.001	1.2
	White Fir	106	102,230	.045	43.5
	Incense Cedar	2	2,091	.001	.9
G	Ponderosa Pine	69	92,400	.061	82.6
	Jeffrey Pine	20	43,845	.018	38.9
	White Fir	1	875	.001	.8
	Incense Cedar				
F	Ponderosa Pine	129	152,309	.078	91.7
	Jeffrey Pine	44	49,931	.026	30.1
	White Fir	31	17,208	.019	10.4
	Incense Cedar	1	194	.0006	.1
All	Ponderosa Pine	513	641,866	.075	93.3
	Jeffrey Pine	108	160,580	.016	23.3
	White Fir	151	133,071	.022	19.3
	Incense Cedar	3	2,285	.0004	.3

Jeffrey pine, which is the second most abundant species in the experimental forest, suffered a per acre loss of 83 board feet. This amounted to a 37 percent increase over the previous year. Block [illegible] had the highest infestation, and was followed by Blocks G, B, F, and C.

The white fir losses in 1940 followed the same trend as those of the pines. The 1940 infestation was 64 percent above that of 1939, giving a loss of 20 board feet per acre. Fir losses were highest in Block C.

Incense cedar, the least abundant species, suffered only insignificant losses in 1940. Three dead trees with a board volume of 2,285 feet were found. This was less by one tree than the loss of 1939.

General characteristics of insect activity in 1940

As already noted, the 1940 loss record was higher than that of 1939 and the highest in the four-year period of continuous records. The infestation was a continuation of the rise in insect activity observed the previous year. Beetle populations, especially those of Dendroctonus brevicomis co., appeared to be actively aggressive and seemed to portend further increases for 1941. This threatened increase was not borne out in the following season, and the 1940 loss proved to have been the culmination of the upward trend in insect activity.

Grouping tendencies in the infestation are shown in Table 4. About 65 groups including 180 trees were found in 1940, compared to 49 groups and 127 trees in 1939. Groups were not only more numerous, but tended to contain more trees. As in 1939 Block C showed the greatest number of groups.

Table 4. Number and Size of Tree Groups in B.M.E.F. Insect Loss Four-Year Period

Block	1937 2	3	1938 2	3	4	1939 2	3	4	5	6	7	1940 2	3	4	5	6
A	1		2				1					1				
B	1	1	3		1	7	3				1	9	2	1	1	
C	3		3	4		13	3		1			18	6	5	1	1
G	3		5			3	1	2				6	1	2		1
F	2		13			11	2	1				10	1	2		
All	10	1	26	4	1	34	10	3	1		1	44	10	10	2	2

The average volume per tree in 1940 was 1292 board feet. This is slightly above the average volume of 919 board feet per tree in the green stand. There was a predominance of loss in the overmature trees, which contained 77 percent of the total volume. The occurrence of previous top-

killing in insect infested trees was recorded in 1941 as in previous seasons. Correlation of the record showed a high incidence of top-killed trees in new infestation. Of the total season's losses, 33 percent of the trees and 30 percent of the volume had been previously top-killed. This frequency of occurrence was well above the frequency of occurrence of top-killed trees in the green stand.

THE 1941 LOSS RECORD

Detected Loss

The 1941 cruise, in addition to completing the 1940 loss total, picked up a portion of the infested trees of the new season. Marked differences in the insect infestation in the ten years were noted. As a means of obtaining further information on the status of the 1941 infestation, especially in areas showing high losses for 1940, a late autumn cruise was made of a series of thirteen compartments sampling 20 percent of the virgin area. With the exception of two additional compartments which were cut over in 1941, the same series was used for similar purposes in 1939 and 1940. The results of the cruise are shown in Table 5. Through October the 1941 loss on the sample amounted to 51 board feet per acre.

Table 5. Summary of Sample Cruise Data and Estimates of Insect Loss for 1941 on the Sleepy Mountain Experimental Forest

Compartment	Timbered Acreage	Sample Cruise Loss Vol. B.M.	Sample Cruise Loss Vol./Acre	Estimated Total Loss Vol. B.M.	Estimated Total Loss Vol./Acre
[illegible]-21-10	64.7	773	11.9	849	13.1
[illegible]-22-4	85.1	3,603	42.3	3,959	46.5
[illegible]-24-4	91.2	4,210	46.2	4,626	50.7
[illegible]-24-7	101.3	3,615	35.7	3,973	39.2
[illegible]-29-10	96.3	8,755	90.9	9,621	99.9
[illegible]-30-1	85.1	4,620	54.3	5,077	59.7
[illegible]-30-3	83.0	7,805	94.0	8,577	103.3
[illegible]-30-6	131.4	8,218	62.5	9,031	68.7
All B	673.4	40,826	60.7	44,864	66.6
[illegible]-4-21	72.9	1,201	16.7	1,320	18.3
[illegible]-2-12	143.1	5,763	40.3	6,333	44.3
[illegible]-5-15	58.9	5,573	94.6	6,124	104.0
[illegible]-9-15	78.3	1,962	25.1	2,156	27.5
All C	280.3	13,298	47.4	14,613	52.1
[illegible]-21-26	99.9	4,282	42.9	4,705	47.1
All Blocks	1,190.3	60,380	50.7	66,352	55.7

Using the autumn cruise data, an estimate has been made of the possible average loss per acre on the forest in 1941. The estimate was obtained by applying two factors of correction to the original data. The first was an 11 percent increase to allow for infested trees that may have escaped discovery in the cruise. This factor is derived from the experience of the previous year, in which 11 percent of the infested volume remained to be picked up after the October cruise.

The second factor was a correction of 37 percent for the possible difference between the loss level of the sample and that of the forest. Calculation of the losses on the sampled area over the past four years shows that the compartments have averaged 37 percent higher than the forest as a whole. Applying this correction, an estimate of 41 board feet per acre for the forest as a whole is obtained. This is a drop of 65 percent from the loss level of the previous year. Comparing the variation of the sample from the forest average from year to year, however, the range in the differences is very wide. In 1937 it was 54 percent; in 1938, 36 percent; in 1939, 7 percent; in 1940, 51 percent. Using the minimum departure of 7 percent as one limit, and the maximum departure of 54 percent as the other, the 1941 loss may be expected to fall between 36 and 52 board feet per acre.

General characteristics of the 1941 infestation

The insect infestation was of an endemic character. Groups were few and involved pairs of trees only. Most of the infested trees were scattered widely through the stand. Trees were slow in fading. Broods often appeared to be light, with mixtures of several species of bark beetles occurring together. Ips emarginatus and Dendroctonus valens were relatively numerous. Pine beetle predators seemed relatively abundant. The 1941 attacks took place slowly during the spring months, perhaps as a result of much unsettled weather lasting until July 1. Lightning-struck trees were common, many of these becoming infested. Some observations indicated that there was a reduced number of generations of Dendroctonus brevicomis during the season. The 1941 infestation promises to be the lowest yet observed on the Black's Mountain forest.

MISCELLANEOUS OBSERVATIONS - 1940-1941

The great reduction in bark beetle activity from 1940 to 1941 was surprising in view of the conditions that seemed to prevail in the previous season. In the summer of 1940 beetle populations seemed to be high, and there appeared to be considerable momentum to the infestation. Comparison now, however, of the rate of increase of the infestation from 1938 to 1939 (55%) and from 1939 to 1940 (14%) shows that the great increase took place in 1939, and that the 1940 infestation underwent a leveling off and reduction of activity not apparent to the observers at the time.

A second observation contributing to the impression of an aggressive infestation was the appearance of Dendroctonus broods in infested trees felled for species composition studies in the autumn of 1940. The

fall-attacked broods were heavy in many trees that had been attacked in late summer. This appeared to indicate great success of the populations in attacking trees. But new attacks during the early autumn were scarce.

In 1941 many of the remaining 1940 trees which had been attacked late in the season and overlooked in the summer were conspicuously slow in fading and drying out. Some trees did not become fully red until late winter. Waterlogged trees were found that produced floss of water from crevices of the bark or when cut into. Basal examinations of the "autumn" 1940 trees often showed incomplete attacks, wholly green butts, or unsuccessful attacks in which the young brood had been overtaken by "sour" conditions. Cases of this sort conveyed the impression that beetle attacks of the 1940 autumn may have lacked vigor, and that environmental conditions may have been unfavorable to survival of eggs and the establishment of small larvae of young broods. The 1940 autumn was exceptional for its prolonged periods of cold, wet, unsettled weather that began early in the season.

In 1941 cold, unsettled weather lasted until July 1. Thereafter temperatures were relatively cool or mild for the most part, with periodic storms at intervals of about two weeks. Cold weather set in again in September. It would seem probable that such climatic conditions would not be without some effect upon insect activities. It is possible that there was an interference with mass emergences and attacks of beetles in the spring, that the development of broods was retarded, and that the length of the growing season was somewhat reduced. Observations on several brood trees during the season showed that some trees were carrying first generation prepupal larvae into the winter of 1941-42, indicating that the number of generations produced during the summer was less than one in some cases, and probably not more than one and one-half in others.

SUMMARY

1. Results are presented of the fourth annual cruise of insect losses on the Black's Mountain Experimental Forest by the Bureau of Entomology and Plant Quarantine.

2. The 1940 loss was the highest in the past 4 years, averaging 117 board feet per acre for the virgin forest area.

3. Block C was the only one of the five forest blocks failing to show increased losses in 1940. The highest infestation was on Block B, averaging 140 board feet per acre. Centers of high infestation occurred in Blocks B, E, and C, and in the center of the forest. Block A had lowest loss, averaging 76 board feet per acre.

4. Compartment losses varied widely - from none to 355 board feet per acre.

5. Ponderosa pine, Jeffrey pine, and white fir suffered highest losses of the past four years. Incense cedar losses were negligible.

6. The 1940 infestation was characterized by high insect activity with more spreading than in previous years. Overmature trees contributed most of the total volume lost. Topkilled trees accounted for one-third of the total number of infested trees.

7. The 1941 infestation promises to be the lowest since the experimental forest was established. From a sample cruise of 20 percent of the virgin area during the autumn of 1941 it is estimated that the current loss will range between 36 and 52 board feet per acre, possibly averaging about 41 feet.

REVIEW OF LOSSES ON THE
BLACK'S MOUNTAIN EXPERIMENTAL FOREST - 1933-1940

The 1941 loss survey completed records of annual losses on the experimental forest for a four-year period, 1937 to 1940, and of total loss since 1933. During this interval the insect infestations have fluctuated between epidemic and endemic conditions. A general review of the losses during the eight-year period is made in this section of the report. Tables of loss records, lettered alphabetically, are included in the appendix.

Comparison of pine losses 1933-36 and 1937-40

Losses of the period 1933-36 were cruised in 1937, without assignment of infested trees to given years. An infestation of epidemic proportions existed during this period, giving a total pine loss of .57 trees and 631 board feet per acre. Average annual loss amounted to 203.4 board feet per acre (5). In 1937 to 1940 total losses amounted to .26 trees and 354 board feet per acre, or about 56 percent of the volume of the previous years. Average yearly volume was 88.4 board feet per acre, or 43 percent of the average annual loss of the previous interval. (Refer to Table A).

Comparison of losses by tree species, 1933-36 and 1937-40

Loss records of the four primary coniferous species on the forest varied individually during the first and second periods of comparison. Losses of ponderosa pine, the predominant species, follow the same trend as those of the pines as a group. They were lower in 1937-40 than in the previous period. Jeffrey pine, however, shows a higher total volume loss from 1937 to 1940 than in 1933-36. White fir loss in 1937-40 has been much below its level in 1933-36. Likewise the 1937-40 incense cedar loss has been lower than in the previous years.

Summary of the pine loss trend, 1937-40

In 1937 pine losses were 70 board feet per acre (Table B). Observations indicated that the infestation was endemic, with trees scattered through the forest and little grouping in evidence (1). In 1938 the total losses were barely lower than those of 1937. Block C showed a 15 percent rise. Marked tendencies towards grouping were evident (refer to Table 4, first section of the report) as compared to 1937 (2). On this basis a rising infestation was expected in the following year.

In 1939 the pine losses were well on the upswing over the previous two years, showing a 55 percent increase for the forest as a whole. All blocks registered increases except Block C, which showed a slight decrease from 1938. Losses averaged 168 board feet per acre. Groups of infested trees were numerous, and a further rise of the 1940 infestation was expected (3).

In 1940 pine losses reached their maximum with 117 board feet per acre. All blocks except C registered increases over 1939, but the average increase of the forest was only 15 percent, falling short of expectations based on a preliminary sample cruise. Grouping reached its maximum (Table D, first part of report), and a high level of loss seemed probable the following year (4).

The 1941 season found the level of infestation much altered. From 1940 summer to 1941 summer the losses dropped to a low level. The tendencies which favored group losses disappeared. Infested trees were few and isolated. Endemic conditions again prevailed.

Summary of losses by tree species, 1937-40

Losses of the several species during the four years followed the pattern of the pine losses in general (refer to Table C). Ponderosa pine showed a loss of 55 board feet per acre in 1937, dropping to 53 feet in 1938, and rising to 84 feet in 1939 and 93 feet in 1940. The infestation decreased 4 percent from 1937 to 1938, increased 58 percent from 1938 to 1939, and 11 percent from 1939 to 1940. Ponderosa pine contributed most of the groups of infested trees.

Jeffrey pine followed the same general trend, with a loss of 15 board feet per acre in 1937. In 1938 there was a decrease of 4 percent to 12 board feet per acre. In 1939 and 1940 the infestation increased by 39 percent and 38 percent respectively, giving a final 1940 loss of 23 board feet per acre.

White fir losses fluctuated much more during the four-year period than did those of the preceding species, but in the same directions. The infestation fell from 16 board feet per acre in 1937 to 7 board feet in 1938, a drop of 56 percent. The following year there was a recovery of 77 percent to 12 feet per acre, and again in 1940 a rise of 61 percent to 19 board feet per acre.

Incense cedar showed very small losses during the four-year period.

Summary of pine losses by blocks, 1933-1940

When one compares the per acre losses of the five blocks of the experimental forest during the period 1933-1940, certain differences between the blocks are readily evident (Table E). Two observations of importance may be made: (1) there is a great range in the amounts of loss in the different blocks, a difference of almost 1,000 board feet per acre between Blocks A and D, during the period 1933 to 1940, and (2) certain blocks consistently rank high or low in losses during separate years and periods of years. These varying degrees of loss reflect differences in the insect risk and susceptibility to attack of the stands of the blocks. Identification of the areas of highest insect hazard is important and significant in entomological and silvicultural management plans for the different blocks.

Block B has had the highest per acre loss consistently in all years. It is the area of highest insect hazard in the experimental forest. Block F is second in loss rate during the eight years, but ranks close to Block C, and in 1933-36 suffered less loss than C. Block C is third; Block D is fourth; and Block A is last. Blocks F, C, and D fall fairly close together with fairly high losses per acre in all periods. Block B has always been well above the other blocks, and Block A has usually ranked well below. Of the areas having high and moderately high losses, Blocks F and C have had the most extensive sanitation-salvage control treatments. In Blocks B and C trailer areas have also been given the benefit of control cuttings.

Comparisons of insect losses in percents of green stand

Expression of the insect drain in terms of loss per acre is convenient and useful for comparisons between different blocks of the forest. However, it does not indicate the real rate of depletion of the stands. The depletion can be shown by expressing losses as percentages of the total green stand of the area. In Table 3 are summarized the percentage losses of the green stand for the different years and periods of years.

From the table it will be observed that the relative insect hazards of the different blocks are the same as they were when expressed in board feet per acre. Block B has the highest rate of loss, followed by F, C, and D, and A. But the significance of this loss in terms of stand depletion is much more evident. In Block B during the period 1933-1940 it will be noted that 8.4 percent of the volume of the original green stand has been killed. This depletion is at a rate of more than 1 percent per year, considerably above the annual increment (5). Block A has the lowest loss rate, amounting to 3.5 percent from 1933 to 1940. For the forest as a whole 5.9 percent of the original volume has been lost in the eight-year interval.

SUMMARY

1. Insect losses of the periods 1933-36 and 1937-40 are compared and summarized. From 1933 to 1936 the infestation was highly epidemic, and losses in pine were 203.4 board feet per acre.

2. Jeffrey pine was the only species showing higher losses in 1937 to 1940 than in the previous years.

3. The infestation trend from 1937 to 1940 was one of general increases. White fir losses followed the same trend as the pines. Incense cedar losses were limited to a few trees.

4. Block B consistently had the highest loss in all years from 1933 to 1940. Block F was second, followed by Blocks C, D, and A.

5. Calculation of insect losses as percents of the original stand shows that the rate of depletion of the stands has been high during the past eight years.

APPENDIX

Table A. Total losses on [illegible] mountain experimental forest
1933 - 1940

Species	1933-36 Trees/acre	1933-36 Vol./acre	1937-40 Trees/acre	1937-40 Vol./acre
[illegible] arosa Pine	.53	576	.22	256
Jeffrey Pine	.04	53	.04	68
White Fir	.48	446	.06	54
Incense Cedar	.01	12	.002	1
Total	1.05	1,089	.322	409

Average annual pine loss, B.M.B.F., 1933-1936 - 203.4 board feet per acre.

Average annual pine loss, B.M.B.F., 1937-1940 - 88.4 board feet per acre.

Table B. Pine Insect Loss on B. M. B. F. - 1933-1940
in Trees and Volumes per Acre

Block	1933-36 Tr.	1933-36 Vol.	1937 Tr.	1937 Vol.	1938 Tr.	1938 Vol.	Ratio 36/37	1939 Tr.	1939 Vol.	Ratio 38/38	1940 Tr.	1940 Vol.	Ratio 40/39	1933-40 Tr.	1933-40 Vol.
A	.16	264	.01	54	.02	35	.65	.04	65	1.85	.05	76	1.16	.29	494
B	.51	957	.03	94	.07	93	.99	.11	137	1.48	.14	180	1.31	1.30	1461
C	.63	713	.04	52	.04	60	1.15	.07	111	1.86	.08	100	.90	.86	1035
D	.47	502	.05	67	.04	65	.96	.05	84	.99	.08	121	1.88	.68	835
E	.59	663	.07	89	.06	72	.81	.09	117	1.64	.10	122	1.04	.91	1067
All	.57	631	.05	70	.05	65	.93	.07	101	1.55	.09	117	1.15	.82	985

Table 7. Summary of Inventory Data [illegible]

Block	Tree Species	1971 Tr.	1971 Volume b.f.	1971 Vol. /A.	Tr.	1972 Volume b.f.	1972 Vol. /A	Tr.	Volume b.f.	Vol. /A.	[illegible]	[illegible]
A	Ponderosa Pine	15	30,000	51.5	8	16,7[illegible]	11.9	15	34,461	3.3	[illegible]	[illegible]
	Jeffrey Pine	8	13,464	10.8	8	17,3[illegible]	21.7	13	[illegible],480	4.3	[illegible]	[illegible]
	White Fir											
	Incense Cedar											
B	Ponderosa Pine	79	91,662	71.7	58	81,[illegible]	67.1	92	115,7[illegible]	[illegible]	[illegible]	[illegible]
	Jeffrey Pine	13	16,299	[illegible]	4	[illegible]	[illegible]	9	17,373	[illegible]	[illegible]	[illegible]
	White Fir	21	26,103	[illegible]	8	[illegible]	[illegible]	8	[illegible],10[illegible]	[illegible]	[illegible]	[illegible]
	Incense Cedar											
C	Ponderosa Pine	84	115,434	[illegible]	102	138,7[illegible]	50.0	169	230,7[illegible]	110.5	[illegible]	[illegible]
	Jeffrey Pine	3	9,250	3.9	2	1,365	.6	1	106	.1	[illegible]	[illegible]
	White Fir	39	59,630	[illegible]	35	[illegible]	[illegible]	61	[illegible]	[illegible]	[illegible]	[illegible]
	Incense Cedar	1	318	.1	[illegible]	[illegible]	.1	1	[illegible]	.3	[illegible]	[illegible]
D	Ponderosa Pine	93	123,[illegible]	[illegible]	71	11[illegible]	[illegible]	96	[illegible]	[illegible]	[illegible]	[illegible]
	Jeffrey Pine	30	48,[illegible]	16.6	20	[illegible]	17.7	17	26,[illegible]	17.7	[illegible]	[illegible]
	White Fir	7	10,[illegible]	[illegible]	4	7,[illegible]	[illegible]	2	4,000	2.5	[illegible]	[illegible]
	Incense Cedar											
E	Ponderosa Pine	96	130,[illegible]	[illegible]	[illegible]	107,1[illegible]	[illegible]	136	17[illegible]	[illegible]	[illegible]	[illegible]
	Jeffrey Pine	34	46,[illegible]	[illegible]	26	[illegible]	[illegible]	41	[illegible]	[illegible]	[illegible]	[illegible]
	White Fir	56	42,[illegible]	[illegible]	12	[illegible]	[illegible]	33	[illegible]	[illegible]	[illegible]	[illegible]
	Incense Cedar				3	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]
All	Ponderosa Pine	368	491,468	[illegible]	330	[illegible]	[illegible]	471	[illegible]	[illegible]	[illegible]	[illegible]
	Jeffrey Pine	88	134,460	[illegible]	60	[illegible]	[illegible]	81	[illegible]	[illegible]	[illegible]	[illegible]
	White Fir	143	[illegible]	[illegible]	59	[illegible]	[illegible]	104	[illegible]	[illegible]	[illegible]	[illegible]
	Incense Cedar	1	318	[illegible]	6	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]

Table 5. Pine Insect Loss on S. F. No. 2 - 1933-1940
in Percent of Green Stand

Block	1933-34 Tr.	1933-34 Vol.	1937 Tr.	1937 Vol.	1936 Tr.	1936 Vol.	1939 Tr.	1939 Vol.	1940 Tr.	1940 Vol.	1937-40 Tr.	1937-40 Vol.	1933-40 Tr.	1933-40 Vol.
A	1.13	1.69	.22	.39	.15	.25	.26	.46	.35	.54	.97	1.65	2.10	3.34
B	4.22	5.52	.37	.54	.31	.53	.51	.79	.69	1.03	1.81	2.89	6.06	8.41
C	3.22	4.10	.19	.31	.23	.34	.37	.61	.42	.57	1.20	1.83	4.42	5.93
E	2.96	3.17	.31	.43	.26	.41	.34	.42	.61	.80	1.52	2.06	4.48	5.23
F	3.00	3.80	.33	.50	.30	.41	.45	.7	.53	.70	1.60	2.28	4.60	6.08
All	3.11	3.78	.28	.42	.26	.39	.40	.61	.50	.70	1.44	2.12	4.55	5.90

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